

## „Open Workshops“ in the context of Smart Cities – Types and Potentials for Sustainability and Innovation

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Smart cities debates recently have paid attention to so called „Open Workshops“. The term comprises different kinds of infrastructures for the shared use of resources for material production and an open innovation process, e.g. non-commercial Repair Cafés, screen printing workshops, and initiatives for bicycle repair. The discursive scenery adds further spatial often more commercially oriented typologies to the debate such as TechShops, 100k Garages, FabLabs, Open Design City, and Hackerspaces [1-3]. Against the dominating growth paradigms of many regional economic approaches, we observe a very lively transdisciplinary debate seeking to cover new and alternative concepts of post-growth production processes [4],[5].

The contribution will give an overview of results of an empirical survey to Open Workshops in Germany and a description/calculation of possible effects for sustainability.

To investigate the work and innovation activities, 453 Open workshops were addressed by a survey. Characteristically, due to the lack of scientific clues it has been left up to practitioners and their self-organization to provide definitions of the phenomenon. ‘Open Workshops’ has been used by the Germany-based Verbund Offener Werkstätten (VOW, Open Workshops Network) as a collective term for various projects and initiatives [6]. Based on a data sample of 103 observations (which correspond to a response rate of 23 %), the social, material and economic processes within Open Workshops have been reconstructed [7].

The strong dynamics of this phenomenon is demonstrated by the fact that the majority of the respondents joined the Open Workshops between 2013 and 2015. Following three different types of Open Workshops are distinguished depending on the type of production: Repair (44%), Modifikation (23%), and New production (33%) (see Figure 1).

TABLE 1: OVERVIEW OF TYPES OF OPEN WORKSHOPS [6].

	<b>Repair</b>	<b>Modifikation</b>	<b>New production</b>
Average workshop size	60 qm	80 qm	153 qm
Average equipment value of machines	750 €	5,000 €	20,000 €
Average monthly net income	1,470 €	1,010 €	1,820 €
Average proportion of volunteers	89 %	71 %	60 %
Share of women	40 %	30 %	20 %
Average age	44 years	32 years	34 years
Organized members in association	18%	75%	49%
Most important source of finance	Donations	Membership fees	Public funding
Three of the most-discussed topics	Environment, Ecology, Consumption	Open Source, Commons, Art	Education, Point of law, Open Source
Most important objectives (of 16 preset)	Alternative to capitalist economies	To enable development of prototypes	To enable development of prototypes

Ratio of recycled to new material	1 : 0.8	1 : 1.3	1 : 3.1
Share of knowledge transfer	12 %	26 %	36 %

**Sustainability effects (with focus on environmental impacts)**

Environmental impacts on the basis of three types of Open Workshops are described and quantified in analogy of derived LCA cases studies. Criteria for the social and economic dimensions has been adapted since the known criteria and indicators (such as for example revenue increase, competitiveness or working conditions, global responsibility) are only partially applicable.

The environmental benefit of the type Repair is unique and is situated in the extension of the useful life of consumer goods and associated resource conservation [7].

The type Modification is for Open Workshops, where for example from scrap wheels new loads wheels designed for individual needs are produced. The environmental benefit can analysed in particular in the use phase by changing of the mobility, by using of used and recycled materials such as wood and textiles (see e.g. Figure 2).

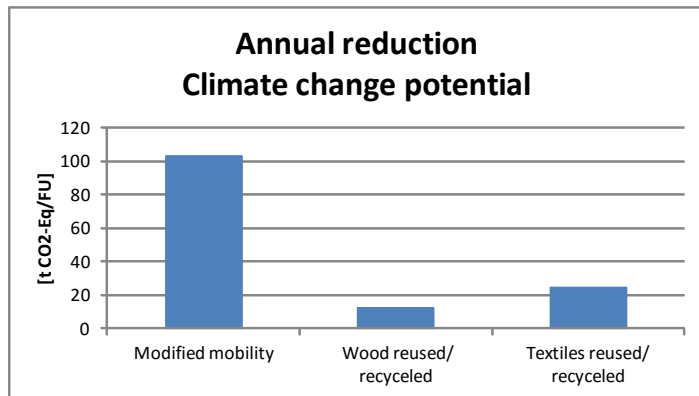


FIGURE 2: TYPE MODIFIKATION: CALCULATED YEARLY ENVIRONMENTAL BENEFIT (E.G. GLOBAL WARMING POTENTIAL; CURRENT STATUS) IN GERMANY.

A contrasting case is the high-tech driven exploration of technical, procedural and economic opportunities to resolve economic problems, mostly on the basis of social conventions. This third type New production is represented by Open Workshops (e.g. FabLab) engaged in 3D printing, laser cutting, CNC-milling and developing solutions for the production of sought-after yet seldom realized micro products. Here the clue to economic value creation is much more obvious as market demand may inspire product refinement as well as enhanced distribution, be it via internet-based social networks or word-of-mouth advertising at the level of local neighborhoods. Positive environmental impacts can be not assumed in principle because it very much depends on the concrete product.

**Conclusion**

Community orientation – not only the material end result or the fabrication of an object – is the principal reason for engaging in Open Workshops. The personal motivations of the actors are not primarily economic, but rather directed towards the transfer of knowledge, practical working experiences and societal transformation. Experimentation with new social forms of learning, knowledge transfer and collaboration is central to the everyday practice in open workshops.

An environmental benefit of Open Workshops can be does not, in principle, because this very much depends on the specific product. Environmental relief effects are quantified for

the types Repair and Modification of Open Workshop.

Non-commercial, do-it-yourself types of Open Workshops may defer the option of creating economic value, e.g. as a retreat in case other options of social protection (social aid, external income, voluntary work) cannot be activated to guarantee for the survival of the workshop. Workshops that come closer to mainstream industrial economies would find it easier to generate scopes of action necessary for selectively implementing original forms of value creation. In addition to sufficiency effects by type Repair classic economic effects are the largest by type New production of Open Workshops.

This study is supported by the project on COWERK that receives funding from the German Federal Ministry of Education and Research under Grant Agreement No. 01UT1401.

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**Keywords:** Open workshop, Open Innovation, Collaboration, Sustainability,